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Outfield ERL@APS Integration

G. Decker, V. Sajaev
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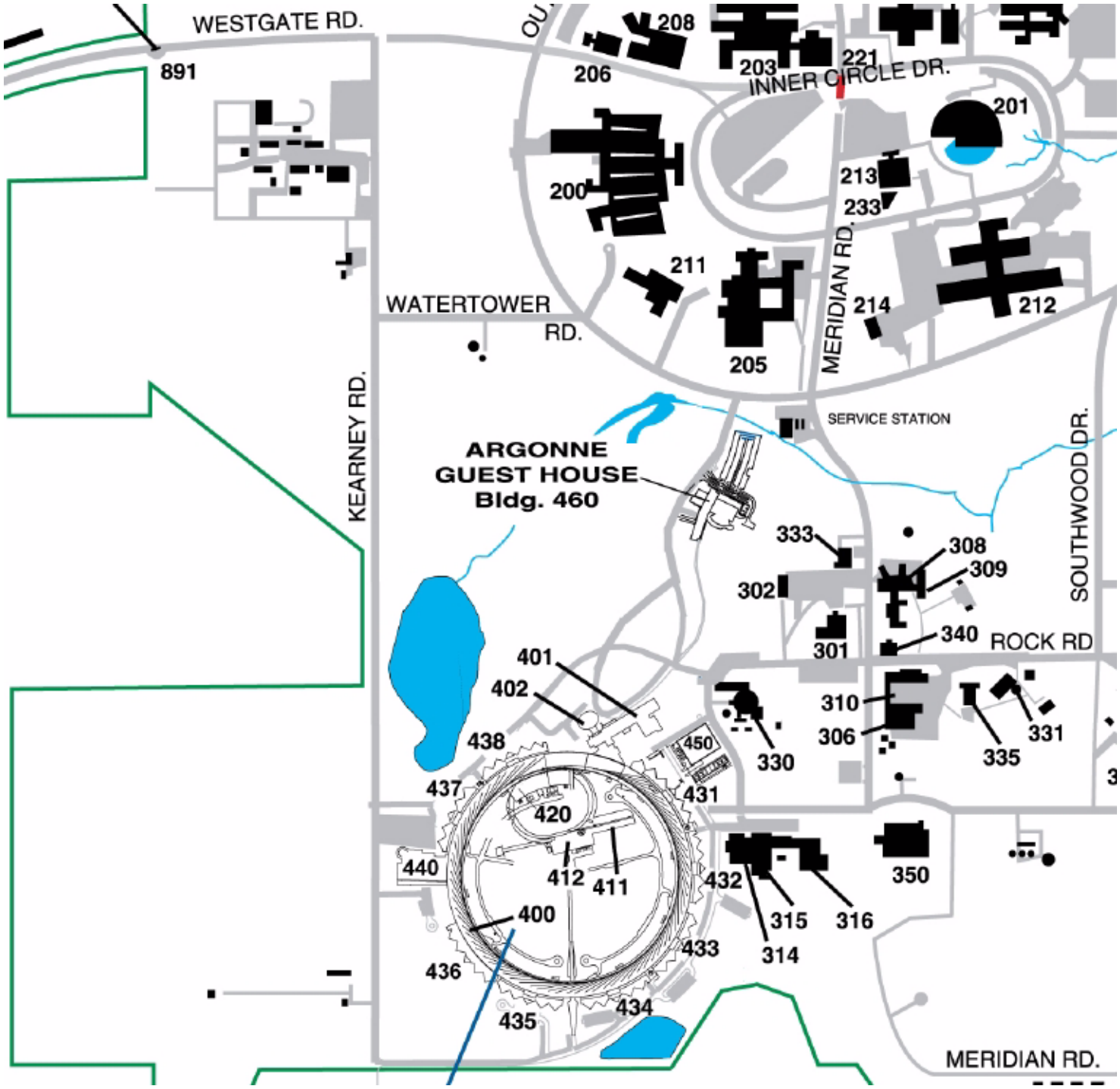
Boundary conditions:

- No significant interruption of 5000 hour / year operation schedule
- No destruction of existing beamlines
- Preserve normal stored beam operation with top-up
- Seamless transition to ERL operation

Desirable outcomes:

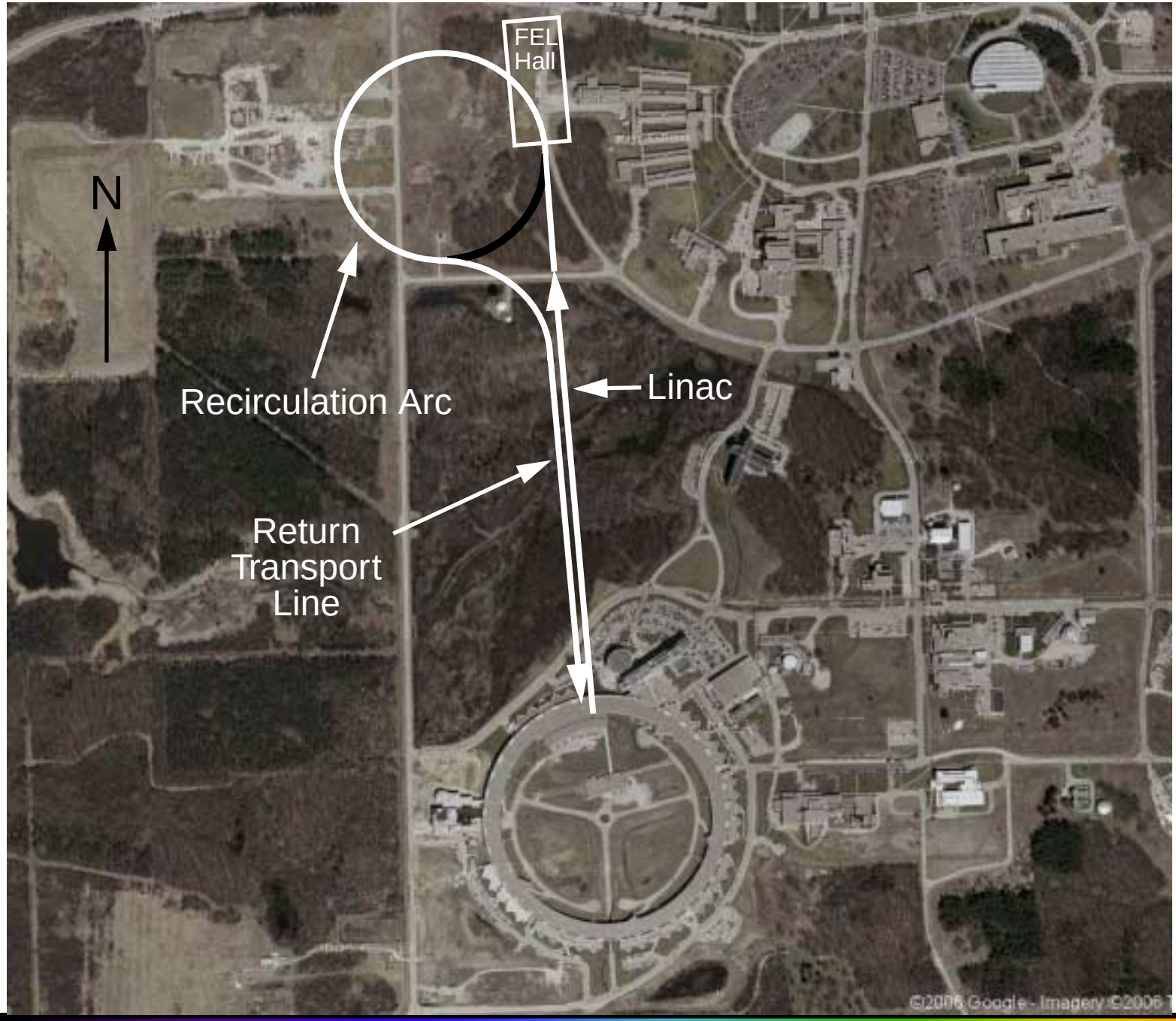
- Maximum transport line bending radius to limit ISR, CSR effects
- Expansion capability for more x-ray beamlines
- Possibility for an FEL

Portion of the Argonne Site Map

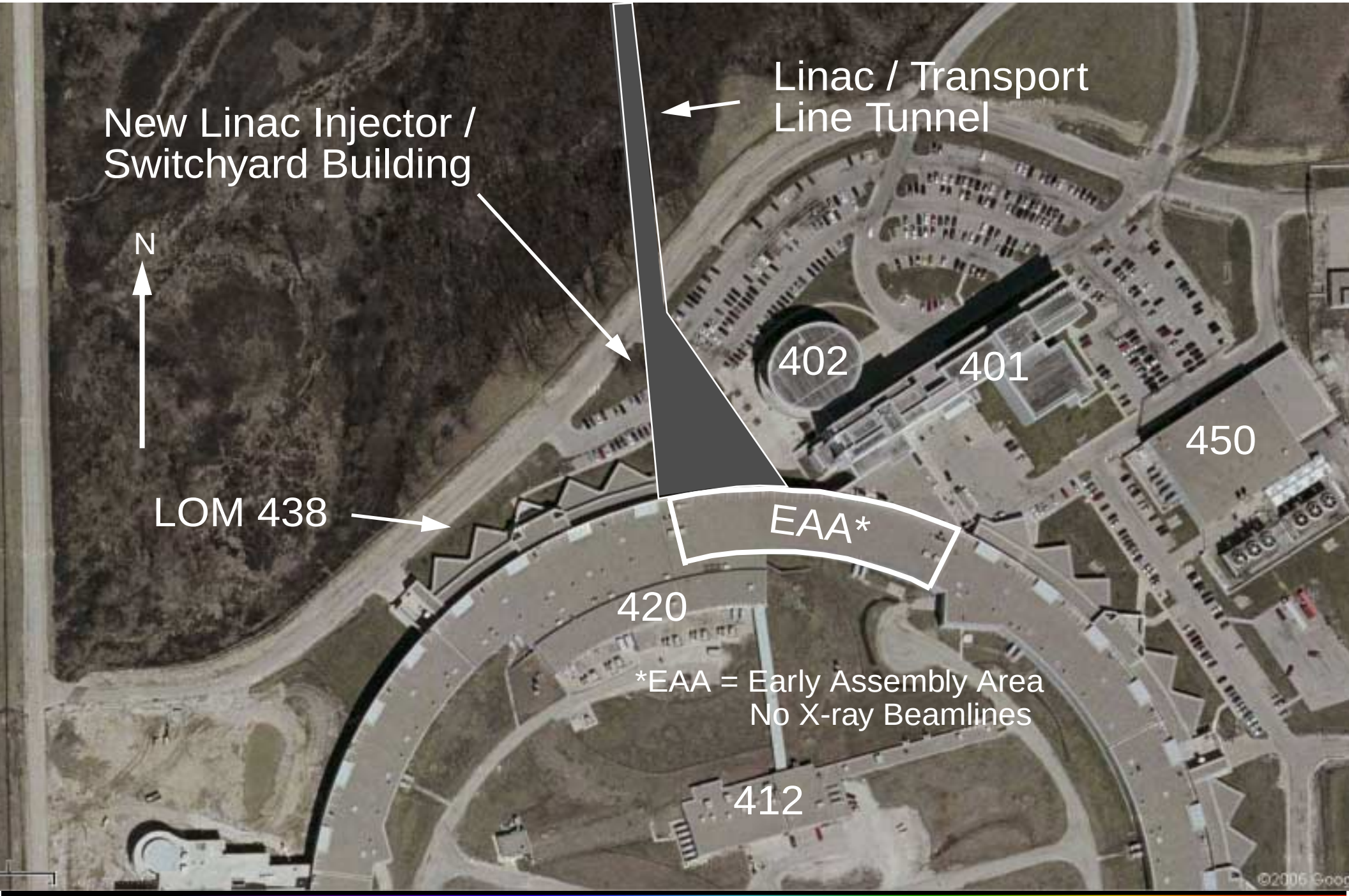


Satellite View of Argonne and the APS

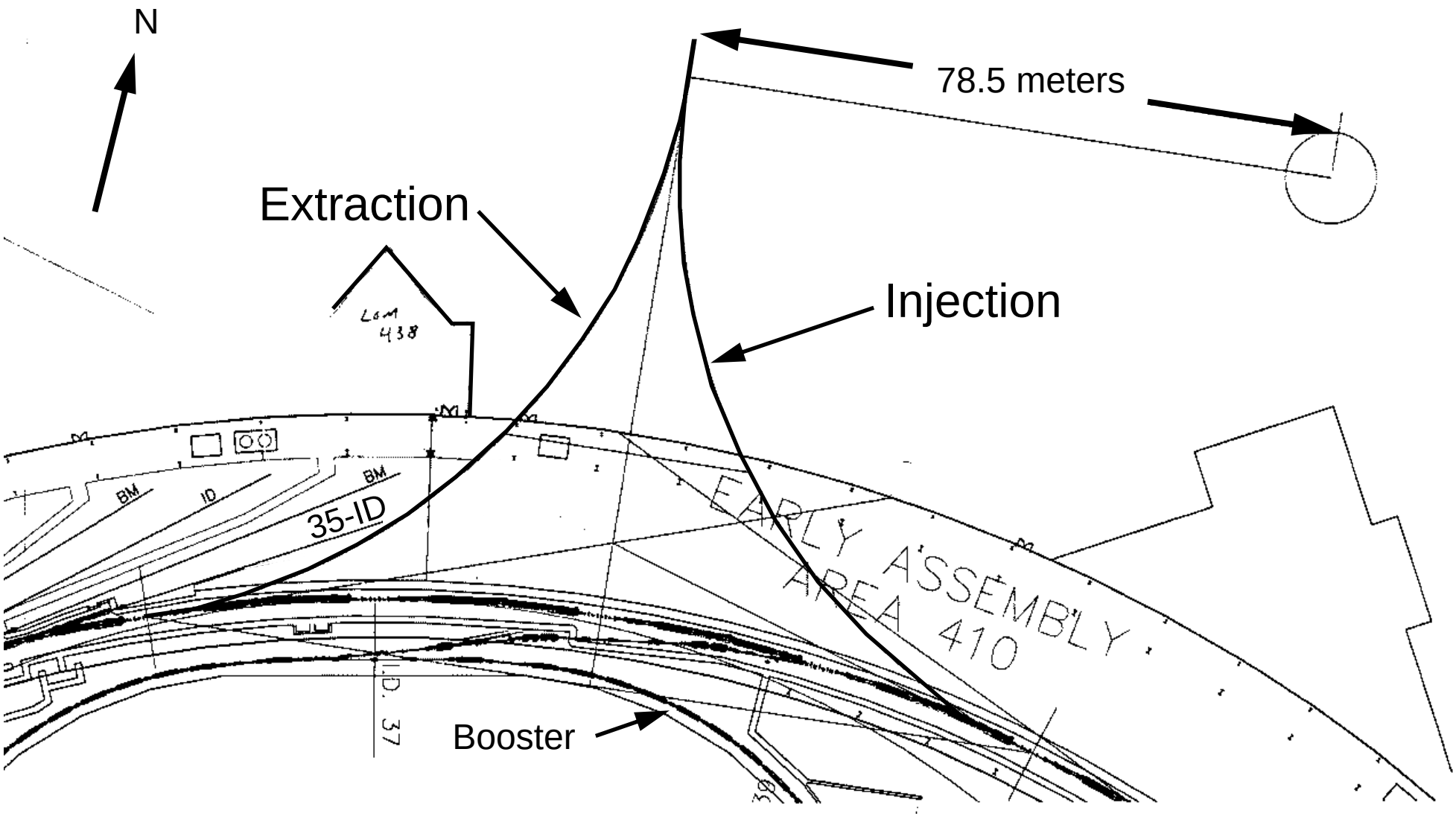
Possible Arrangement for Outfield ERL@APS Option



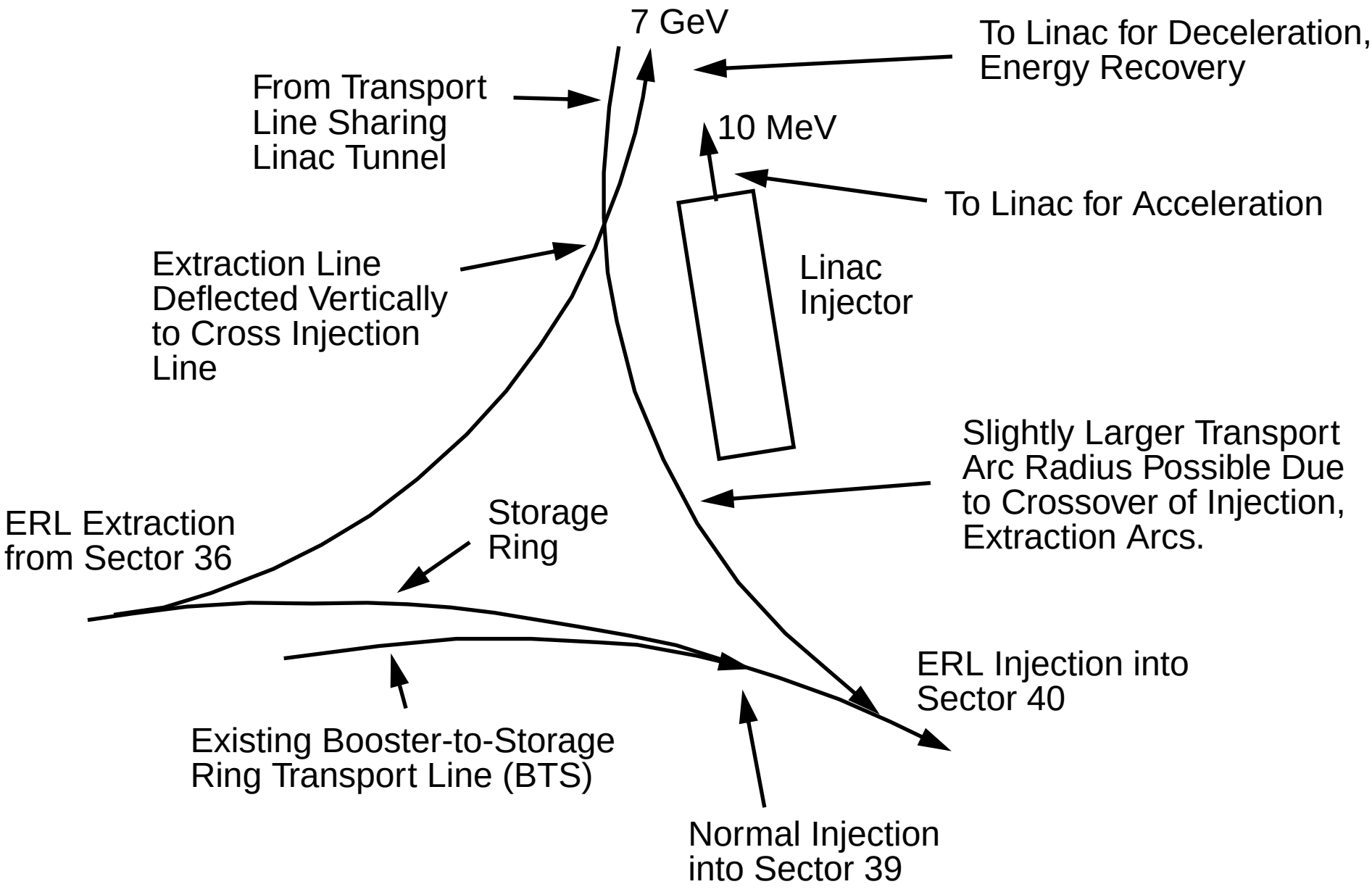
Linac Interface with APS Experiment Hall



Approximate Location of Injection / Extraction Arcs



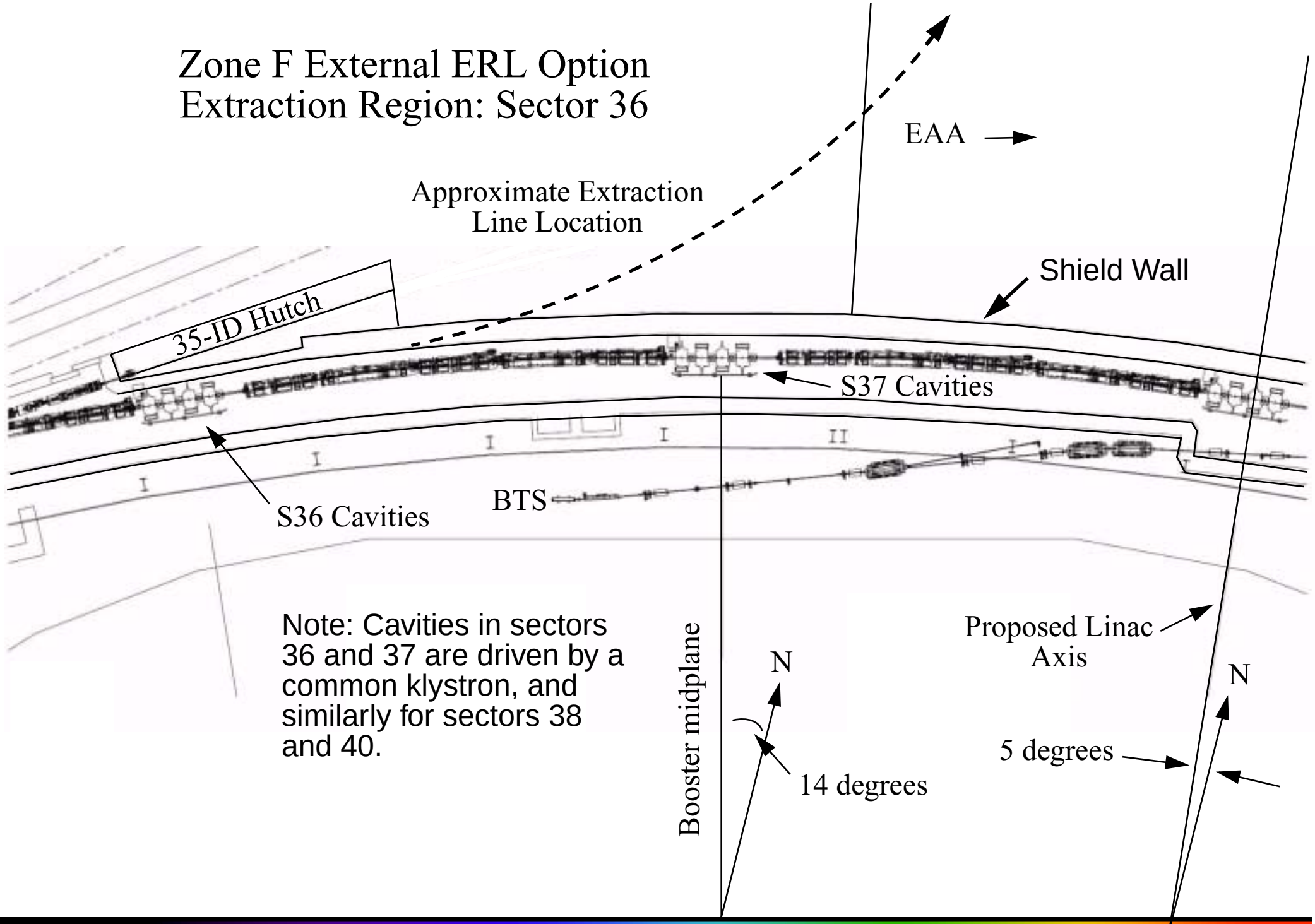
Proposed Arrangement of Components - Injector / Switchyard Region



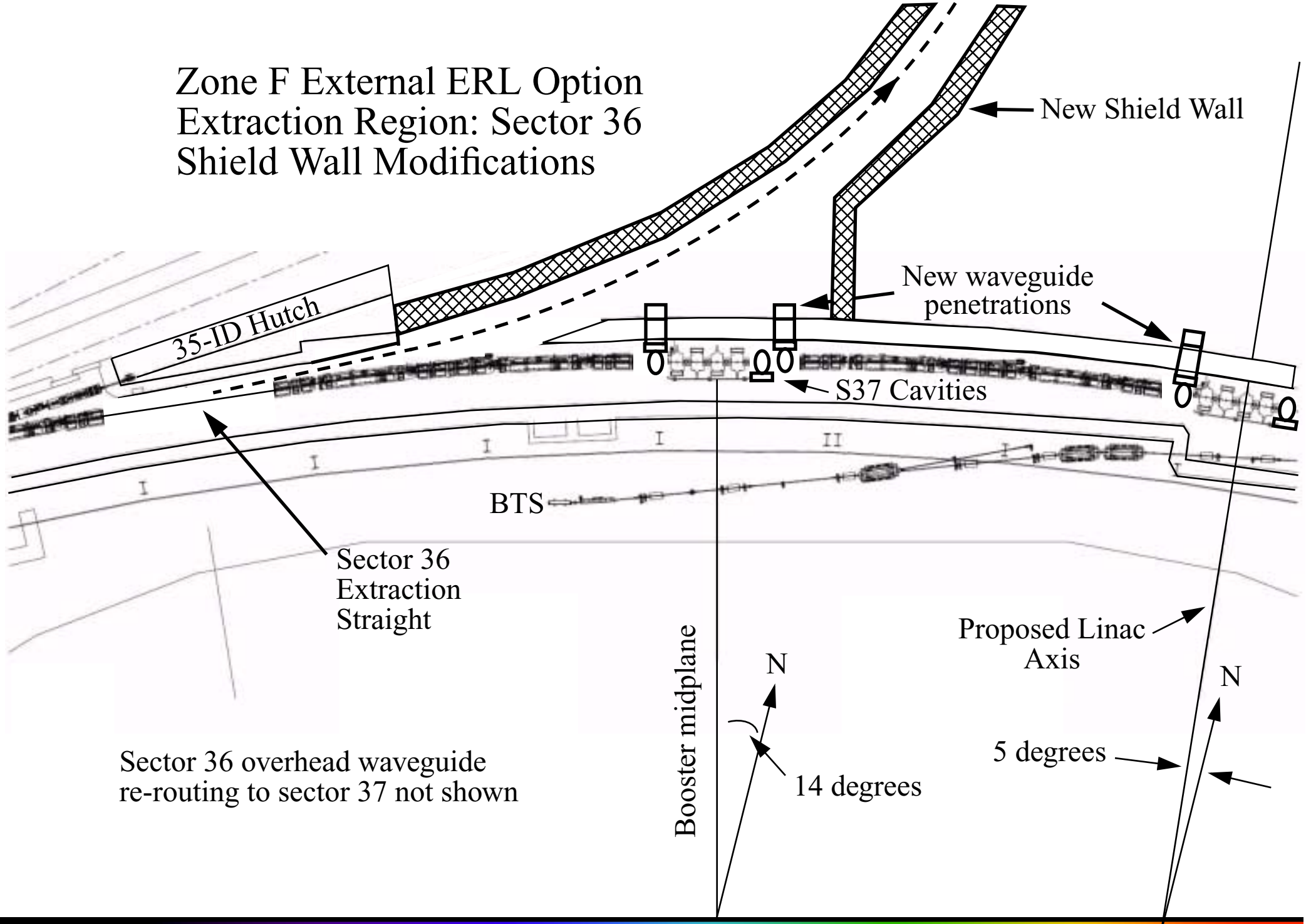
APS Storage Ring RF System Parameters

• Energy Loss / Turn:	5.6 - 7 MeV
• Nominal RF voltage:	9.4 MV
• Maximum RF voltage:	12. MV
• Cavity type	Copper, single cell, 352 MHz
• Number of RF cavities:	16, in 4 sectors: 36, 37, 38, and 40
• Minimum number of cavities for 102 mA operation	12
• Number of available waveguide penetrations / sector	5
• Number of klystrons:	2 ∗ 1 MW, with 2 warm spares
• Maximum stored beam current:	250 mA
• Nominal stored beam current:	102 mA

Zone F External ERL Option
Extraction Region: Sector 36

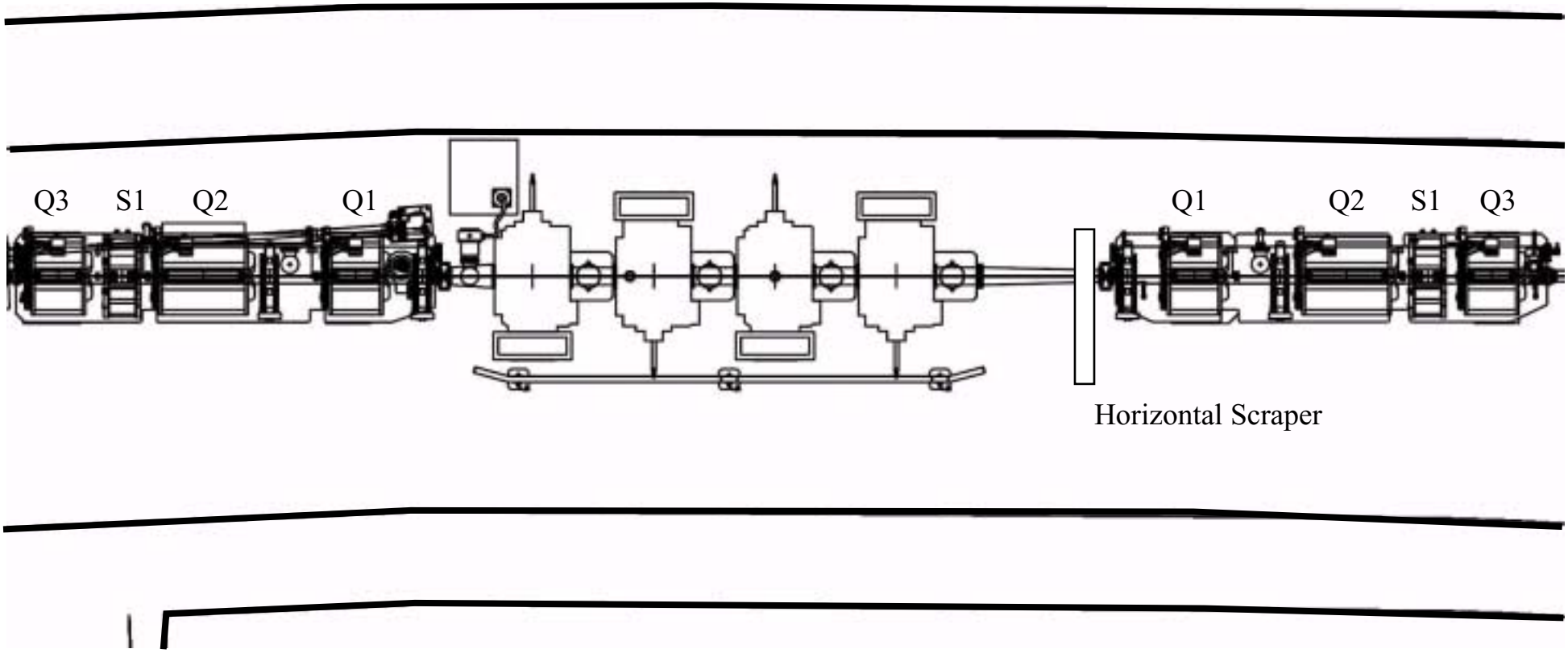


Zone F External ERL Option
Extraction Region: Sector 36
Shield Wall Modifications

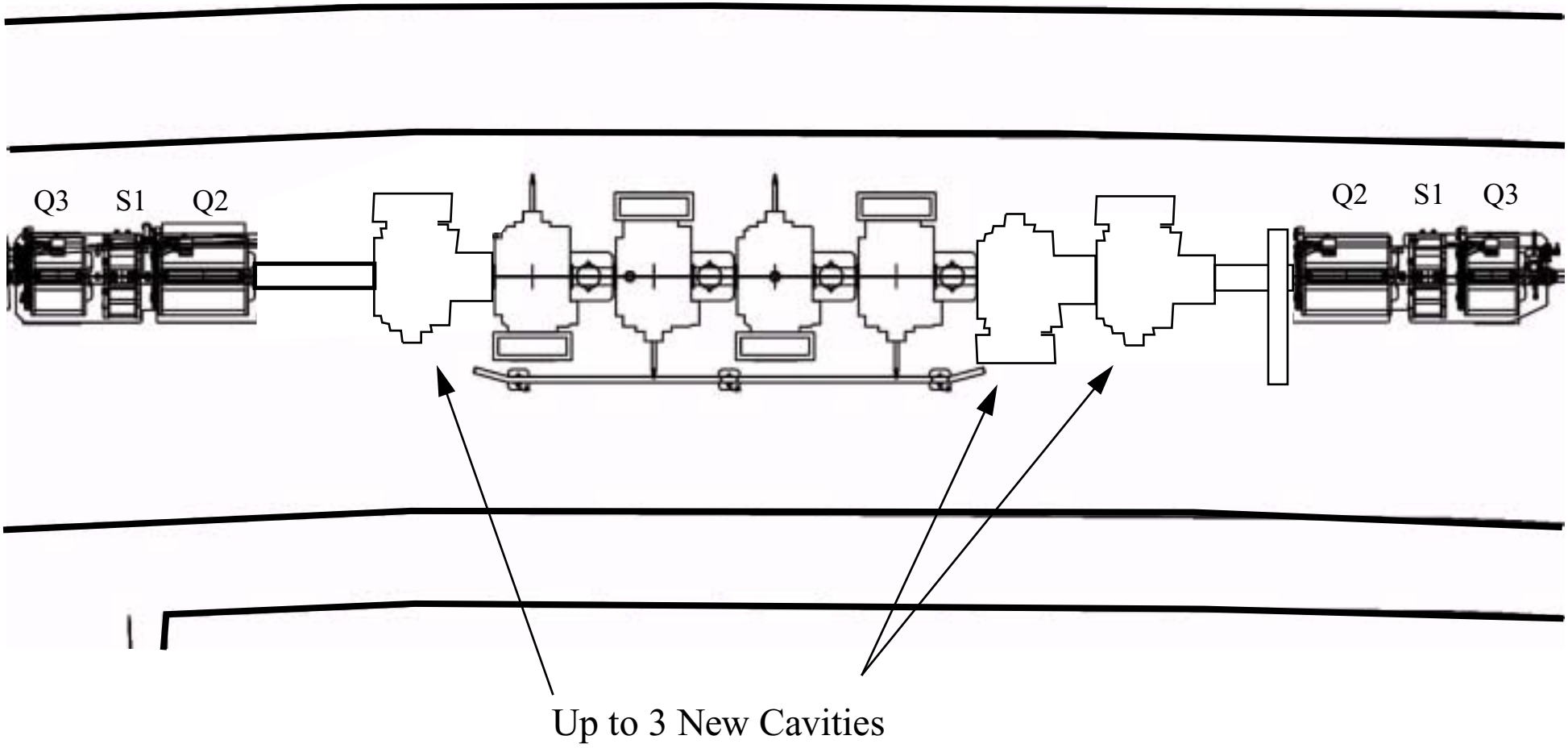


Sector 36 overhead waveguide re-routing to sector 37 not shown

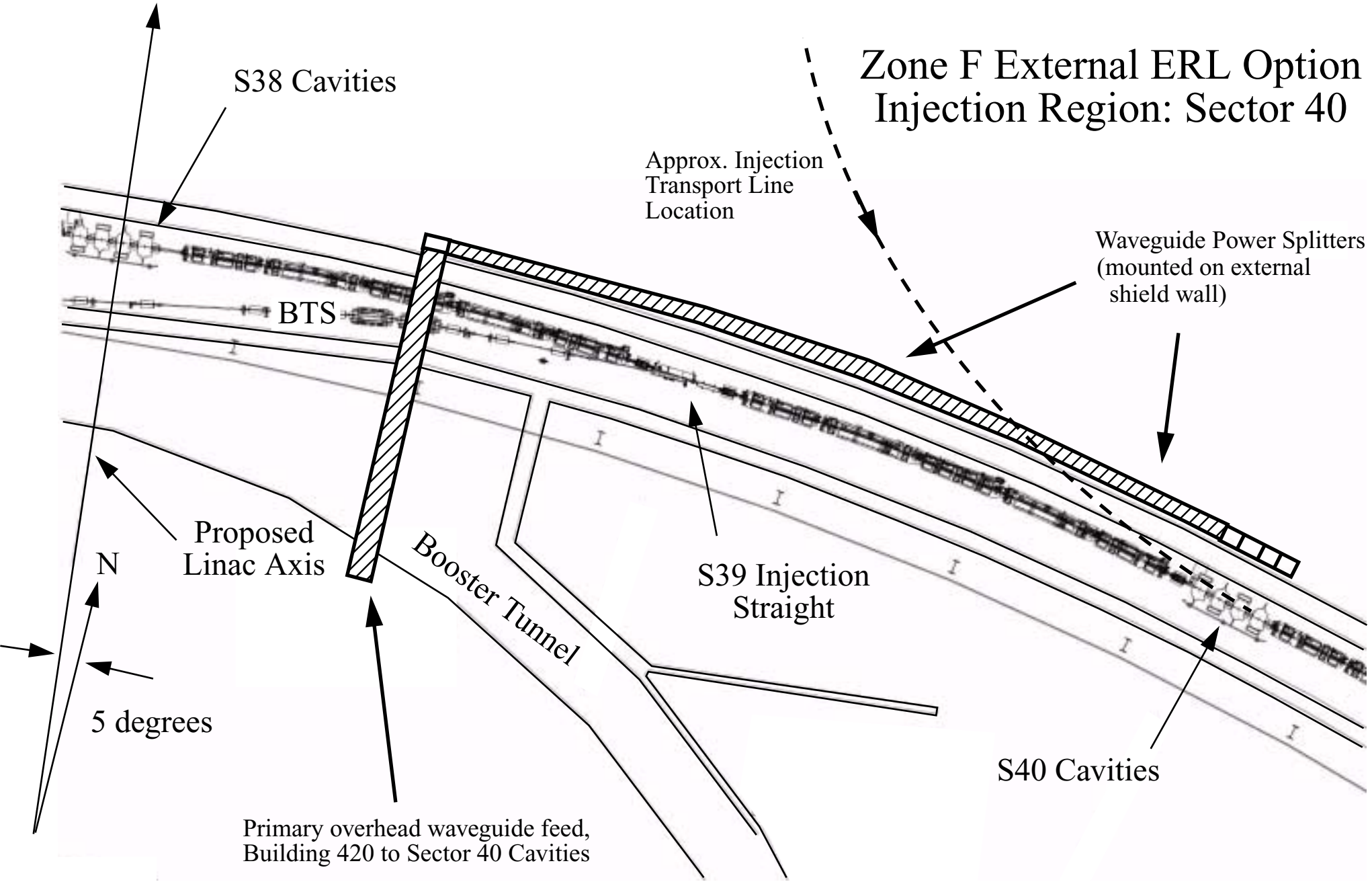
Sector 37 RF Straight Section: Present Installation



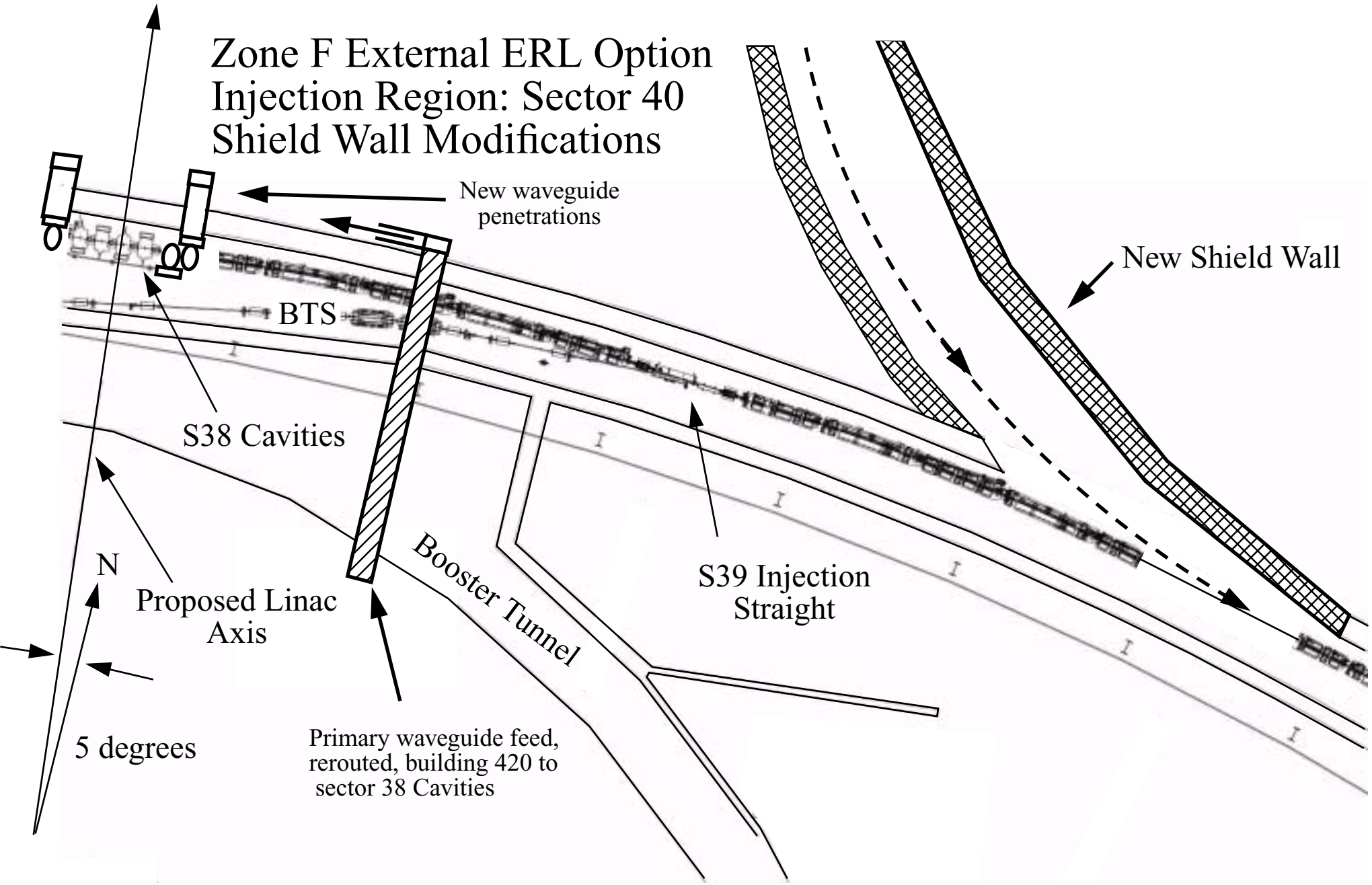
Sector 37 RF Straight Section: Proposed Arrangement with Q1 Removal



Zone F External ERL Option Injection Region: Sector 40



Zone F External ERL Option Injection Region: Sector 40 Shield Wall Modifications



Conclusions

- Outfield ERL@APS option is possible with significant modifications to the rf systems and shield wall, confined to Zone F, where no beamlines are located.
- It appears that 14 cavities total can be squeezed into sectors 37 and 38. This will be sufficient for 102 mA operation.
- Significant reconfiguration of the shield wall in Zone F will be required to allow for injection, extraction, and new waveguide penetrations.
- With all rf contained in sectors 37 and 38, the ERL beam will never pass through a storage ring cavity.
- Significant mechanical engineering is required to allow removal of Q1 quadru-poles - shorter girders and vacuum chambers will be required.
- ERL injection / extraction straight sections will require significant redesign to eliminate mechanical interference while maximizing transport line bend radius.
- Work can be phased to minimize impact on APS x-ray beamline operation.